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The Impact of Prosthetics on Amputee Quality of Life

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Introduction

After someone loses a limb, the process of recovery can be difficult, both physically and emotionally. Nearly every aspect of a patient's life must be adjusted to accommodate for their disability, which can put a strain on them and the people around them. This can drastically impact their quality of life, as found in a study by Godoy and colleagues (2002). In this study, thirty participants with amputations of the lower limb were given a quality of life test, compared to another group of thirty non-amputees that primarily consisted of the participants' relatives, who were brought in as a control. The amputee participants scored significantly lower than the control group in physical capacity, physical aspects, emotional aspects, social aspects, pain, and general health. This was six of the eight factors tested by the study, showing just how much of an impact the loss of a limb can have on the daily life of an amputee (Godoy et al., 2002, p. 399). A prosthetic limb can alleviate some of this strain and allow the patient to a have a greater quality of life. In addition, a supportive and encouraging team of professionals can further improve a patient's rehabilitation and give them a better sense of confidence in their situation.

Rehabilitation

Amputations can be carried out for a variety of reasons. Some of the most common include "cancer, congenital deficiency, trauma or inadequate blood flow" (Mathias and Harcourt, 2014, p. 395), with the leading cause being complications related to diabetes mellitus, especially in older patients (Murray & Fox, 2002). In addition, there is a growing number of former service members who require amputations due to trauma acquired while serving in the armed forces. A significant portion of the younger generation of these veterans, particularly those who served in Iraq and Afghanistan after the events of September 11, 2001, were victims of explosive weapons such as "improvised explosive devices (IEDs), rocket-propelled grenades (RPGs), mortars, and

mines" (Melcer et al., 2010, p. 147). Lower limb amputations are more common than upper limb amputations, partially due to these trends.

The loss of a limb is not as uncommon as one would assume. Approximately 1.6 million people in the United States are living with limb loss. Thirty thousand to 40,000 amputations take place annually, and this number is expected to at least double by 2050. (Mathias and Harcourt, 2013, p. 395). This amounts to roughly 1 in every 190 Americans that have had at least one amputation, with more occurring each year.

The process of rehabilitation starts in the hospital, as the patient waits for their body to recover from surgery. A dressing may be placed on the limb to help with edema and to protect the wound through the first few weeks of healing (See Figure 1). This could mean soft dressings like elastic bandages, non-removable rigid dressings with or without a prosthesis, removable rigid plaster dressings, or prefabricated post-operative prosthetic systems (Sanders & Fatone, 2011). Once the patient is released from the hospital, which can take several weeks, they can be fitted with a temporary prosthesis for physical therapy, if they have not already received one (Hanger Clinic Prosthetics & Orthotics, 2018). They will be educated on the options for what kind of prosthesis they can receive, and a style of suspension system will be selected that is the best possible fit for the patient's body and goals. After the patient reaches a certain level of confidence on the temporary prosthesis, and their body is healed enough to have a prosthesis of better quality made

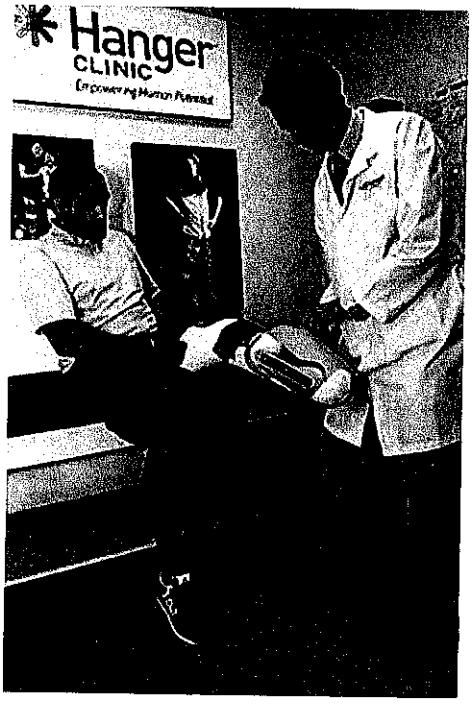

Figure 1. A rigid dressing is put on a residual limb as it heals (Hanger Clinic Prosthetics & Orthotics, 2018).

for them, a prescription will be written, and they can come to a clinic to be measured and cast in order to make a socket for a custom-made limb. The patient must be able to tolerate light pressure on the residual limb before they can be considered for this stage (Department of Defense et al., 2014). This new limb should last 2 to 4 years, and the patient should visit the clinic twice a year for regular maintenance (Hanger Clinic Prosthetics & Orthotics, 2018).

Physical Effects

Leading up to getting this limb, patients experience a variety of physical changes. The most obvious one is the loss of the limb itself, which, depending on how much of the residual limb is left, can significantly affect mobility and the patient's ability to function independently. For instance, someone who lost a leg can no longer walk without some sort of assistive device, and may have balance problems while doing something as seemingly simple as transferring from a wheelchair to the bed, or standing up from a chair. The risk of falling is therefore a common concern for someone with a lower limb amputation (Miller et al., 2011). Someone who lost an arm, even below the elbow, may have trouble with daily tasks like dressing or writing, especially if the amputation was of their dominant hand, and any activity that requires two hands is now much more difficult, if not impossible (Ligthelm & Wright, 2014, p. 104).

In addition, the residual limb goes through significant volume fluctuations due to edema, muscle atrophy, other fluid fluctuations, and residual muscle activity, especially during the first 12-18 months after the amputation, although it does still occur on a lower scale after the limb matures (Sanders & Fatone, 2011). Edema is a type of fluid build-up composed of excess intracellular and extracellular fluid, caused by injury. It can be one of the biggest obstacles to healing because it limits blood supply to the tissues. As blood passes through the tissues, fluid

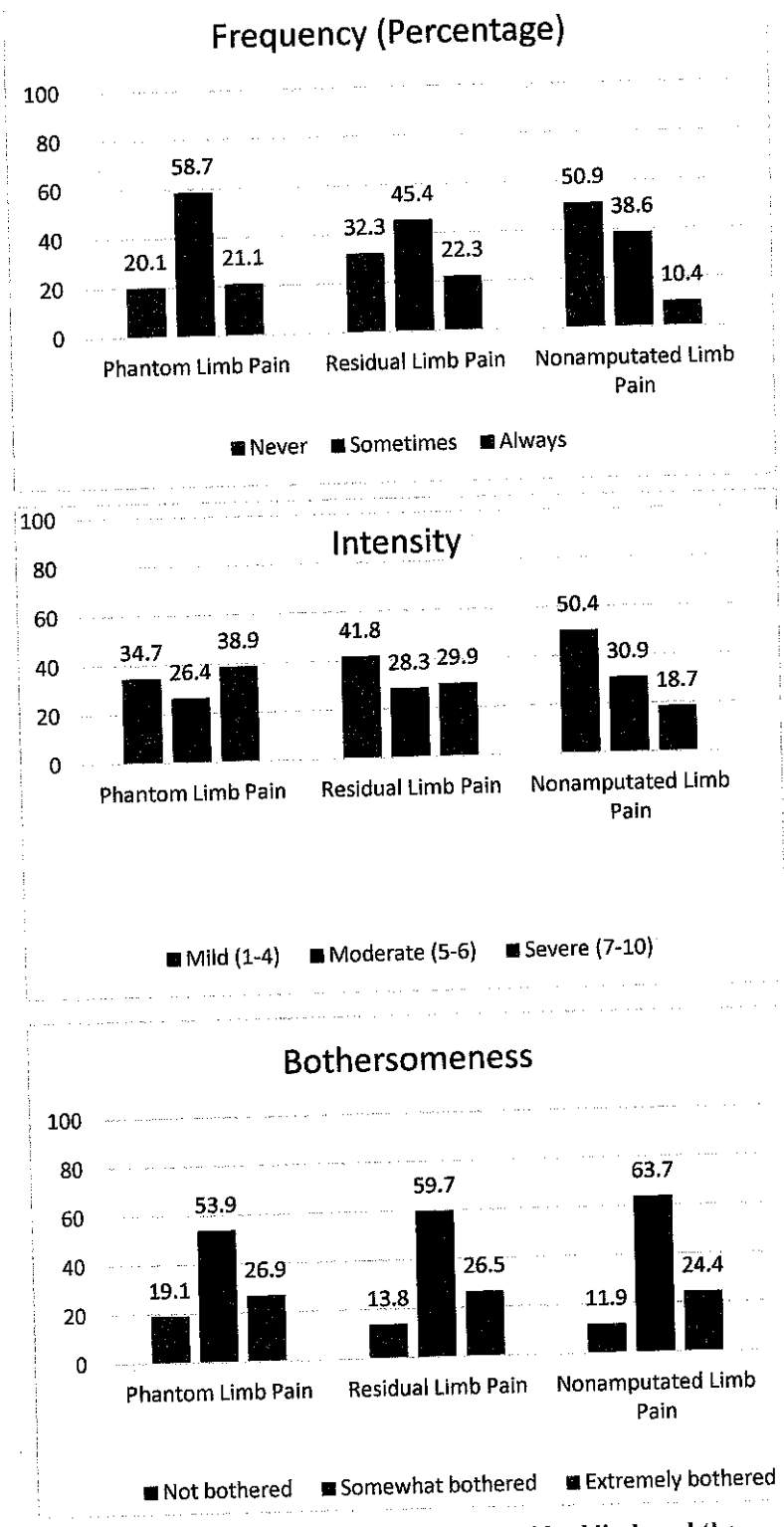

Figure 2. Patients rated their pain in the residual limb and the nonamputated limb, as well as their phantom pain. Data from Ephraim and colleagues (Ephraim et al., 2005).

from the lymphatic system can build up in the limb over the course of the day, and the limb swells (Sanders & Fatone, 2011). These changes can be so drastic that it affects the fit of a socket for a prosthetic limb, so certain styles may not be possible until the majority of the fluctuation subsides (B. Rogers, personal communication, 2018). This is usually alleviated with tight-fitting, gel-lined sleeves for the residual limb, as well as layered socks to take up the extra space as the limb shrinks (Sanders & Fatone, 2011). These can be added and removed over the course of the day as needed to maintain the fit and stability of the socket (B. Rogers, personal communication, 2018).

Those who have had a limb

amputated experience a significant amount of chronic pain. This can be include pain in the residual limb due to the surgical wounds that are currently healing or have healed, or to the secondary problems that come from the adjustment, such as back pain. Amputees can also experience a phenomena called "phantom pains", often also referred to as "phantom limb". This is a recurrent physical problem, which is suspected to occur due to changes in the nerves in the residual limb, as well as connections in the brain that are still trying to control the portion of the limb that has been amputated. There are multiple mechanisms that could cause this phenomenon, including the development of neuromas, defined as a mass of nerve tissue in a residual limb resulting from the regrowth of severed nerves (Neuroma, 2018), as well as "altered activity in the dorsal root ganglia, changes in the spinal cord circuitry, the brainstem, thalamus, and the cortex" (Dietrich et al., 2011, p. 97). Patients may feel a sensation in their absent limb, such as itching or tingling in the foot of a leg that has been amputated, or pain that is described as "burning, cramping, or shooting" (Murray & Fox, 2002). Five to ten percent of patients experience phantom pains that are significant enough to seek medical care. These sensations happen most often in the first few months after the amputation, although they can persist for years afterward. It is also more common in patients who lose a limb at an older age (Hanger Clinic Prosthetics & Orthotics, 2018). While they can be either painful or non-painful, symptoms of phantom limb can be difficult to deal with, and can prolong a patient's rehabilitation significantly through extended hospital stays and the need to have their prosthetic limbs adjusted more times than someone who does not have these sensations, or does not have them as severely (Murray & Fox, 2002).

Despite these problems, amputation of a limb severely damaged by a traumatic injury still yields better outcomes than keeping it and attempting to heal the damage. According to one

study by Doukas (2013), in which service members deployed to Iraq and Afghanistan were surveyed to rate their level of function and mental health, patients with lower-limb amputations of any type, whether it was unilateral or bilateral, had better functionality scores than patients with similar injuries who underwent limb salvage. They were more likely to engage in physical activity, although there was not a significant difference in pain ratings (Doukas et al., 2013, p. 142). The explosive weapons used in Iraq and Afghanistan are known to cause complicated injuries to limbs, such as "open fractures, extensive damage to soft tissue, nerves, and arteries, and internal bleeding" (Melcer et al., 2010, p. 147). As such, the changes of salvaging the limb and attempting to restore some level of functionality are poor, so it is easier to amputate and use a prosthetic limb instead. This difference in functionality is something that the patient may need to come to accept, as part of the process of coming to terms with the loss of their limb.

Psychological Effects

Amputees experience increased levels of anxiety and depression as they adjust to their new circumstances. In a study by Durmus and colleagues (2015), the anxiety levels of men who had lost a limb due to injury were compared to those of a control comprised of non-amputee men of similar age. Both groups were given questionnaires to rate their anxiety, and the amputees were given an additional questionnaire to rate the intensity of their phantom limb pain. Results showed that amputees rated higher than their healthy peers in anxiety and sleep disturbance (Durmus et al., 2015, p. 50). This is especially true if the amputation was due to a traumatic event, and even more so for veterans. Belon and Vigoda (2014) examined the changes imposed by the amputation of a limb, and the emotional impact of such a sudden adjustment. The grief from the loss of a limb can be just as devastating as the grief from an event like the loss of a loved one, and patients often go through the same stages of grief and learn similar coping

strategies as someone in this type of situation in order to reach a level of acceptance regarding the changes that have occurred (Belon & Vigoda, 2014, p. 55). A patient who lost a limb would suddenly be faced with a loss of functionality, changes in body image, depleted finances, and both social and physical discomfort. This often leads to depression and anxiety that must be addressed alongside the physical adjustment. Rates of clinical depression in amputees have been found to be approximately 23 to 35 percent in an outpatient setting (Rybarzyck et al., 1995, p. 103), going as high as 35 to 51.4 percent in some studies (Ephraim et al., 2005). The national lifetime prevalence of depression is only 13.23 percent (Hasin et al., 2005, p. 1099), meaning that depression is three to five times more common in inpatient amputees than in the average American population (Ephraim et al., 2005). Amputees often experience certain symptoms of depression, namely indecisiveness, thoughts of death, and ideas of self harm (Kalif et al., 2004). In general, amputees were found to rate higher for both anxiety and depression than their non-amputee peers, and those who experienced chronic pain and phantom pain after their amputation rated even higher (Mckechnie & John, 2014, p. 4). Some predictors of poor psychological adjustment to the loss of a limb include limitations in activity, time since the amputation, and age of the patient (Ephraim et al., 2005).

Body image can also be affected by the amputation of a limb. Patients may not feel as attractive after the loss of their limb, and their confidence may suffer (Belon & Vigoda, 2014, p. 54). In the study conducted by Godoy (2002), where participants were asked to rate their quality of life, no participant rated the physical aspects of their life above a 50 percent, and the scores for their emotional state were not much higher, in a significant contrast to the control group (Godoy et al., 2002, p. 399). Amputees may withdraw from social situations, making it difficult to maintain relationships with those around them. Additionally, this dissonance between body

image and the way a patient's body looks may contribute to phantom pain, as the patient's brain still believes that there is a full limb attached to the body where there is now only a residual limb.

Some patients end up turning to drugs or alcohol as a coping mechanism, which further exacerbates the depression and strains on their relationships with others. Amputees are at a particular risk for abusing opioids and other pain medications, as recovery from an amputation is painful, and strong pain medication is required, especially through the first stages of the healing process. Some of the medications prescribed include morphine for more severe levels of pain, codeine for lesser pain, oxycodone, propoxyphene, hydrocodone, hydromorphone, and meperidine (Morris, 2005). All of these medications can be addictive, especially when they are not used as prescribed. Substance abuse is already an issue in society, with the national rate at approximately eight percent as of 2014 (Substance Abuse and Mental Health Services Administration, 2017), and the annual death toll specifically for opioid overdose falling above 146,000 as of 2016 (Goodnough, 2018). In this specific context, this abuse can come with added problems. As the patient abuses their pain medication, their body builds up a tolerance, making the beneficial pain-relieving effects less effective. This leads to a higher dosage, which can have detrimental effects on their body and make them feel even worse (Morris, 2005). On top of this, the patients are using these medications to cope with the loss of

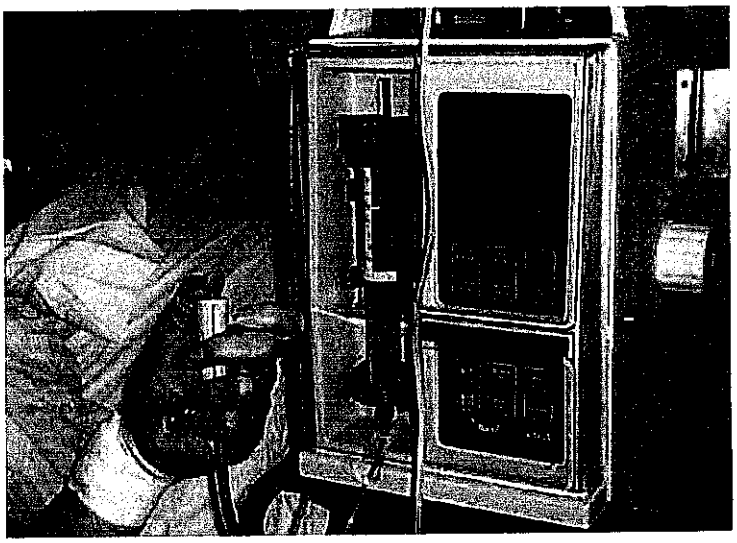

Figure 3. A patient-controlled analgesia (PCA) pump in use (Bernstein, 2014).

their limb, instead of taking steps to learn healthy coping mechanisms, and it can exacerbate problems with relationships in the patients' lives. Since refusing to prescribe these medications to recent amputees is not an option, medical professionals often use a patient-controlled analgesia (PCA) pump to administer doses of medication as needed. This way, the patient can receive pain relief when they feel it is necessary, but can only have a certain amount in a certain time frame (Sunrise House, 2018).

Sociological Effects

Someone who has lost a limb is now considered disabled. They may not be able to work at the job they had, because of their new physical limits, so they may find themselves suddenly struggling to do the jobs they once did regularly, or may even lose their jobs entirely. This may be due to physical capability, or to pain levels. The amount of pain a person experiences can impair function to the point of being its own obstacle to maintaining regular employment (Ephraim et al., 2005). According to Sinha (2011), slightly more than half of the participants were unemployed at the time of the study, even though 80 percent of the participants stated that they were employed prior to amputation, and 82 percent of those people cited their amputation as a direct cause of their loss of employment (Sinha et al., 2011, p. 94). Applying for disability can be an arduous process, and can take as long as three to five months to process and be approved (Social Security Administration, 2018). It is fairly common to be denied benefits two or three times before this approval even happens, and afterward, there is a two year waiting period before the benefits go into effect (Belon & Vigoda, 2014, p. 54-55). In the meantime, patients may be dependent on their spouses or families for financial support (Ligthelm & Wright, 2014, p. 104), and may lose their health insurance (Belon and Vigoda, 2014, p. 55).

The financial burden of major surgery, physical therapy, and eventually, a custom-made prosthetic limb can be large. For instance, depending on the suspension system, as well as the level of the amputation and complexity of the technology in the limb, a prosthetic limb can cost a patient thousands of dollars. A basic prosthetic for walking on flat ground can cost five to seven thousand dollars. A higher-end prosthetic like the C-leg, an above the knee computerized prosthetic by Ottobock that is controlled by muscle movements, can cost as much as 70 thousand dollars, including the foot (CostHelper, 2018). Insurance would cover part of the cost, and patients could be paying as little as a copay and a coinsurance of 10 to 50 percent (CostHelper, 2018), but with the high cost of a prosthetic limb, patients can still be left several thousand dollars in debt from the remaining portion and the cost of insurance (Belon & Vigoda, 2014, p. 54). Affording a prosthetic limb without insurance can be even harder, as they would have to pay the full price out of pocket. In addition, the required physical therapy can cost 50 to 350 dollars a session, and occupational therapy can cost 50 to 400 dollars per session (CostHelper, 2018). Without a steady income, paying all of these debts off can be difficult. This added stress can worsen the depression and anxiety often felt by amputees, as they can feel a large measure of guilt for the amount of debt that they have accumulated in getting the device or devices that they need.

Additionally, society has a stigma against those with disabilities. Amputees may find that people stare, are less patient with them, or exhibit judgmental attitudes towards their difficulty with day-to-day tasks (Ligthelm & Wright, 2014, p. 105). Rybarczyk (1995) examined the social stigma that amputees face in society, as reported by the participants. Receptionists in five prosthetics clinics offered a survey to everyone in the waiting room on randomly selected days. These surveys asked about the participants' body image in relation to their amputation, their

perceived social stigma and social support, their level of depression, their quality of life, and their satisfaction with the fit of their prosthetic limb. Results showed that social stigma positively correlated with higher levels of depression (Rybarzyck et al., 1995, p. 104). This is evidence that those who have lost a limb may internalize the kinds of negative views perpetuated by society, which can have detrimental effects to their rehabilitation. This kind of social embarrassment can get in the way of functioning in society, and they may not be able to hold a job or maintain a family in the same way they once could.

The stress of coping with the loss of a limb can make it difficult for amputees to maintain relationships with those around them. The problems described by Mckechnie and John (2014) show what kind of strain the emotional burden can cause on interpersonal relationships. Despite the fact that 93.5 percent of patients had gotten married at some point during their lives, and 84.8 percent of the subjects had children, 19.8 percent attended marriage counseling, and the group had a divorce rate of 30 percent. Ten out of the 11 patients from one study were single by the time the study concluded (Mckechnie & John, 2014, p. 5).

Prosthetics and Professional Care

With so many issues working against them, it is no wonder that patients feel worse about themselves after their amputation. Luckily, prosthetic limbs are widely available, and can be made to suit nearly any need that a patient might have. Covers and custom laminations can even be made to personalize a patient's new limb and make it more aesthetically pleasing, which doubles as incentive to wear it as often as possible as part of their everyday ensemble, as the appearance of a prosthetic limb can be a high priority to some patients (Murray & Fox, 2002). This often comes in the form of brightly-colored sockets, in as many patterns as one could find in

Figure 4. A custom lamination (left) for a transtibial prosthetic leg (Motion Unlimited, 2018), and a realistic cosmesis (right) for a prosthetic foot, made to be a near-exact replica of the original (The Alternative Limb Project, 2015).

prints of fabric. Certain companies, like The Alternative Limb Project, have gone a step further, and make custom designs that are only limited by materials, budget, and the wearer's imagination. This level of customization allows for a personal touch, which might help amputees see the limb as an extension of themselves, and might remove some of the stigma of having a prosthetic limb by making it an opportunity for self-expression and creativity. This more positive and playful attitude might encourage them to wear their prosthesis more often. In turn, the increased amount of time wearing the limb means a faster adjustment period, as they get more practice using it in a shorter amount of time. All of this amounts to an improved quality of life, both physically and emotionally.

For others, a well-made prosthetic limb can also ease some of the social and psychological problems that come with the loss of a limb by being made to blend into the patient's body, concealing the limb and alleviating some of the feeling of being judged or

"different" (Mathias and Harcourt, 2014). This can be done by mixing pigments into the resin used to laminate the socket, in order to color the limb a similar shade as the rest of the wearer's body (B. Rogers, personal communication, 2018). Another way is with a cosmesis, a cover that is fit around the prosthetic to copy the shape and color of an organic leg. Some of these are just a simple vinyl sleeve that is form-fit to the prosthetic limb, while others are so realistic that they have fingernails and toenails, freckles, and even veins. At a glance, these advanced cosmeses are nearly indistinguishable from an organic limb.

A well-fit prosthetic can alleviate many of the common problems for amputees, and provide a starting point to work on several more. Mobility in particular can be improved, and satisfaction and quality of life are shown to significantly improve with the increased mobility provided by prosthetic limbs. Amputees can become more independent, as they are able to pursue careers, carry out tasks in their day-to-day lives, and do activities that would have been difficult or impossible to accomplish otherwise. For prosthetists and other health care professionals caring for these patients, this means that restoring mobility should be a high priority (Wurdeman et al., 2017, p. 3-5). Recent advancements in technology can further assist with this goal. Microprocessor knees and computerized parts simulate a more natural range of motion, making mobility and function even easier than ever before. Certain models of prosthetic knees, like the X3 by Ottobock, are exceptionally durable and provide superior mobility and accommodation for high levels of

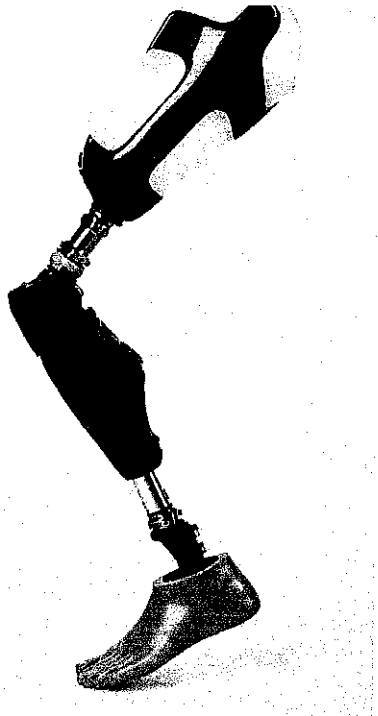

Figure 5. The X3 microprocessor knee by Ottobock, attached to a socket and foot (Berkowitz, 2013).

activity in patients, with some options allowing for aquatic exercise and exceptionally strenuous activity on uneven terrain, with fall recovery as an added feature (Ottobock, 2017). This particular knee is reliable enough that it was designed for use by the military, to get soldiers back in the field.

Edema can also be addressed with a well-fit socket. The process of walking on a prosthetic leg can create enough pressure to push fluid out of the tissues through the force exerted by the socket, and the muscle action required to move the limb. Vacuum-based suspension systems have been shown to assist with this as well, as they can balance the amount of fluid flowing into the limb compared to the amount of fluid flowing out of it (Sanders & Fatone, 2011). This will reduce the amount of fluctuation in the size of the residual limb, and promote healing as blood flow is restored.

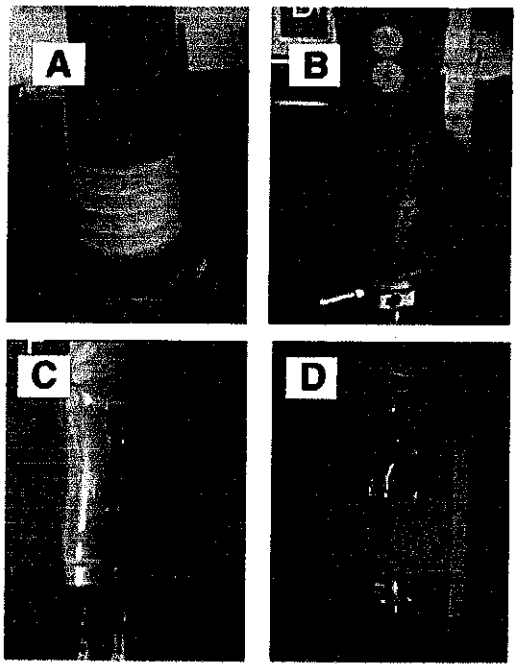

Figure 6. Some options for suspension systems include suction (A), pin/lock (B), magnetic coupling (C), and the HOLO system (D) (Gholizadeh et al., 2014).

By selecting a style of suspension system in a prosthetic that suits a patient's needs, function can be further restored, and overall quality of life will improve. As non-use or limited use of a limb can be a problem when a patient is going through physical therapy, a patient's satisfaction with their prosthetic limb ensures that they will use it as often as possible. This is key in their rehabilitation, as patients depend on their prosthetic limbs to attain a satisfactory level of independence, and the more comfortable and confident a patient is on their new limb, the easier it will be for them to improve (Ligthelm & Wright, 2014, p. 105). According to the study carried

out by Gholizadeh and colleagues (2014), in which they compared a new suspension system (HOLO) for transtibial amputations to the existing technology currently available to amputees, some common factors that determine satisfaction with a particular suspension include ease of putting on and taking off the limb, the fit of the limb, and achieving a low level of pistoning during movement. Additionally, the safety, comfort, durability, appearance, and cost should be considered when working with a patient to find the best limb for their particular case (Gholizadeh et al., 2014). There are several options of suspension systems to choose from, including this HOLO system, pin/lock, suction, vacuum, and magnetic coupling. It is even possible to mount the prosthetic limb directly to the bone in the distal end of the residual limb, for added stability (Hagberg et al., 2008, p. 35). Every patient has specific needs that need to be considered when determining which suspension system will suit them best. For instance, a patient that has a large amount of fluctuation in their residual limb would not need to use a suction suspension system, as the change in size would affect the seal holding the limb to the patient's body (B. Rogers, personal communication, 2018). These needs may change as the patient continues to recover from their amputation, and periodic appointments with the prosthetist can monitor whether a change of system would be beneficial at a later date.

Figure 7. A suspension system using a socket (left) compared to a system using osseointegration (right). The prosthesis is secured directly to the patient's femur (Frölke et al., 2017).

Prosthetic limbs can help to alleviate some of the symptoms of phantom limb. For some people with lower limb amputations, putting on the prosthetic and taking a short walk can lessen or temporarily alleviate phantom pain (Hanger, 2018). In the study by Dietrich (2011), eight amputees were given prosthetic hands with somatosensory feedback on grip strength. The participants wore these prosthetics for two weeks, and documented their progress. All participants reported a reduction in phantom pains after using the prosthesis, due to the feedback provided by the ability to open and close the hand. This is a similar approach to others that are used to treat phantom limb, such as sensory discrimination training, mental imagery, graded motor imagery, mirror therapy, and virtual visual feedback (Dietrich et al., 2011, p. 99). By giving a physical replacement for the limb that feels as natural as possible, the patient's brain can be convinced that the limb is present again.

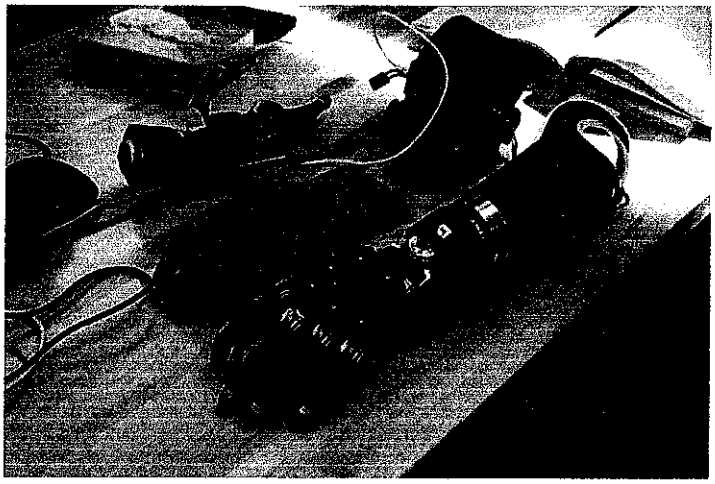

Figure 8. A prosthetic forearm with somatosensory feedback. This gives the limb a sense of touch (Wolters Kluwer, 2015).

It should be noted that receiving a prosthetic limb will not solve all of a patient's underlying problems related to the loss of a limb and the difficulties resulting from this loss. Prosthetists should work in conjunction with other professionals, both in the medical and psychological fields. Talbot, Brede, and Metter (2017) studied the change in quality of life caused by the addition of a new treatment alongside the Military Amputee Rehabilitation Program (MARP). The participants were sorted into two groups, one of which received neuromuscular electro-stimulation during their treatment. They then rated their self-perceived

physical and mental health after the 12-week rehabilitation program. Physical health improved with the new treatment, but there was not a significant change in mental health from this alone. The researchers concluded that more focus should be put on a patient's mental health during treatment (Talbot et al., 2017, p. 1623). A multidisciplinary approach to patient care, with plenty of communication between fields, yields the best results in the long term. In her dissertation, Bates (2016) examined the features of emotional and psychological support for amputees that were effective in alleviating some of their distress. She interviewed amputees who lost their limbs to traumatic injury, and focused on the support they received during their recovery, which kinds were the most helpful, and any differences between veterans and civilians. Interviews were conducted over Skype, using open-ended questions that had been reviewed by two representatives of the population (p. 79). It was ultimately concluded that a balanced support system, alongside medical care, can help amputees maintain their physical, mental, and emotional well-being (Bates, 2016). Identifying these effective forms of support, as well as those that may not have been so effective, can give insight into where health care professionals can further improve the process for their patients. Patients require care from therapists and psychologists in order to adapt to their amputation and accept that it has happened so that they can proceed with their lives. The more support a participant receives as they heal, the easier it is for them to accept the loss of their limb (Ligthelm & Wright, 2014, p. 106). A patient's satisfaction with their prosthetic limb and their ability to cope with the loss of their limb may be directly related. Those who are having a harder time accepting the fact that their limb has been amputated are theorized to use their prosthesis as an excuse or a form of denial, and report lower levels of satisfaction with the limb, while those who are experiencing a better recovery and have

worked through more of the emotional turmoil brought on by the loss of their limb are likely to rate their satisfaction with their prosthetics as higher (Murray & Fox, 2002).

Further Steps

The effect of professional care on the quality of life of amputees is significant. In addition to the increased mobility facilitated by prosthetic limbs, prosthetics can provide a means of reducing pain and phantom sensations in the residual limb. This can lead to increased confidence, a reduction in depression and anxiety related to the loss of the limb, and a renewed sense of independence and capability. In turn, this can improve relationships with the people around them and potentially even allow the patient to enter the workforce again instead of relying on disability payments for income. Improving physical conditions can lead to improvements in other aspects of the patient's life, and improve their overall quality of life.

Going forward, more research should be conducted on techniques to care for patients' mental health, especially early in their recovery. This could prevent psychological effects of undergoing an amputation from becoming as severe, as the treatment would begin before the conditions had a chance to impact the patient as strongly.

One way that professionals can do this is by better preparing the patient for the eventual loss of their limb. Before the amputation, barring emergency circumstances that would not allow for this, professionals should discuss the process of psychological healing and help the patient put a plan into place in order to have resources at their disposal by the time the amputation actually occurs, when they are needed. This can be further facilitated by an increase in communication between fields, to give a multidisciplinary approach to patient care and keep each professional up-to-date on the patient's needs throughout the healing process. Better

education about the effects that should be expected as the limb heals, and what should be expected to change in their lives outside of the medical context, could allow patients to have the chance to make arrangements better to support themselves during this healing process.

Another way that better care for those receiving prostheses could be accomplished is by putting more emphasis on support groups. Since patients often feel unprepared for the events that occur before and after the loss of their limb (Bennett, 2016), having contact with those in similar situations could provide assistance with both acceptance of the loss of the limb and combating the isolation and depression that often comes with it. Support groups have been shown to reduce depression by addressing the patient's fears and anxieties about their amputation (Marzin-Groller & Bartman, 2005). These groups can meet in person or online. One such group, called AMPOWER, is connected to Hanger Clinic as an online chat group coordinated by amputees, for amputees (AMPOWER, 2018). Members meet to discuss changes in their lifestyle due to their amputations, provide advice to other members, share their experiences, and become more educated about life after the loss of a limb. Groups such as AMPOWER and Amputee Coalition, two groups geared toward supporting amputees, can help with the transition from life before the loss of the limb into the patient's new lifestyle (Bennett, 2016), while the social aspects of support groups can allow patients to feel like they have a wider support system to assist them in coping with the challenges that come with an amputation.

Finally, amputees should be encouraged to see a mental health professional to treat the psychological impact of losing a limb. In study conducted in India, 40 patients were monitored for a period of 2 months. At the beginning of the study, they were given a series of surveys to determine their level of depression. Each participant was then treated for their psychological symptoms according to their needs. At the end, they were tested again, and their scores were compared with those from before treatment. 72.5 percent of the participants suffered from a psychiatric condition related to their amputation, and 40 percent fell in the range for a diagnosis of depression. After treatment, only 50 percent of these participants were still experiencing significant symptoms, and 27.5 percent were still depressed (Kashif, 2004). With continued treatment, these numbers could reasonably be expected to fall further. This is a hopeful sign for amputees suffering from depression and anxiety due to the loss of a limb. Still, the number of amputees who experience these symptoms remains high. More research could be conducted that is specific to this population in order to find new techniques that may lead to even better outcomes.

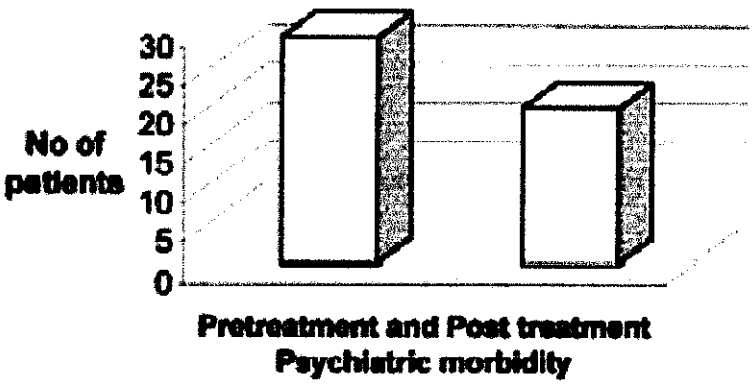

Figure 9. Out of 40 participants, 29 (72.5%) suffered from some sort of psychiatric condition related to their amputation. After treatment, that number fell to 20 (50%) (Kashif, 2004).

In conclusion, prosthetics are an efficient first step towards recovery for someone who has lost a limb. With expert professional care, and adequate access to other resources outside of the clinic, patients can be expected to reach a level of functionality and independence that would have been much more difficult to achieve only a few decades ago. However, the current care

options between the initial amputation and the consultation with the prosthetist as well as ongoing care after a prosthesis has been fitted are lacking in several areas. Patients feel that they have not been adequately prepared for the challenges that they will face after their surgery, which contributes to the severity of the psychological symptoms they will face. This in turn affects patient quality of life and ultimately, survivability. More emphasis should be put on encouraging patients to find people who they can talk to about their struggles, both in therapy and in support groups.

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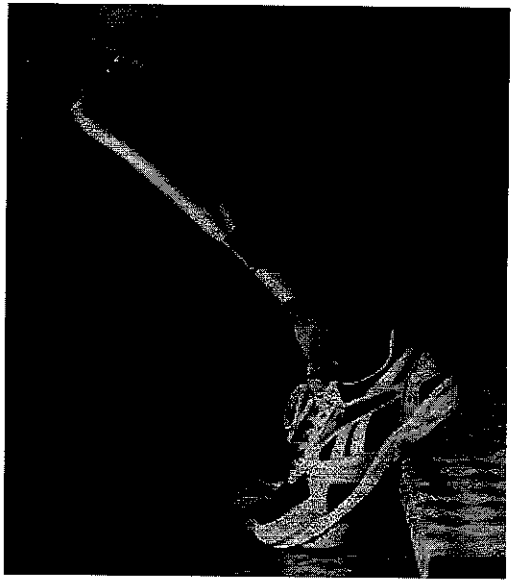
Plan Ahead

- Get in contact with a prosthetics clinic before your surgery to set up a plan
- Undergoing an amputation is a big change. It is recommended that you see a therapist, preferably before your surgery.
- You may be in the hospital for a few weeks. Plan with this in mind.
- You may not be able to work after your amputation. Start the process of getting disability as early as you can.
- Depending on the nature of your amputation, you may need accommodations in your home.
- You will need physical therapy after your surgery.

If you have any questions not answered in this brochure, please contact your doctor.

Living With An Amputation

What to expect post-operation



(Helena, 2011)

(University of Salford Manchester, 2018)

The First Weeks

When you wake up, the residual limb will be wrapped in dressings, and you may be fitted with a rigid dressing as well to protect your wound. You will also have a pump to administer pain medication as needed. Your nurse should explain how to control the dose.

After You Leave the Hospital

Your prosthetist will assist you in choosing a style of prosthetic limb that best suits your needs, so that you can start physical therapy. There will be some fluid build-up and volume changes in your limb as time goes on. This is normal, and should lessen somewhat as your limb heals.

You may experience "phantom pains." This can include an itching or tingling sensation in the missing limb, or pain that has been described as burning, cramping, or shooting.

Techniques to Cope With Phantom Pain

- Wrap the limb in a warm, soft towel or a heating pad.
- Wrap the limb in an ice pack or apply cooling gel.
- Mentally exercise the limb when the pain occurs.
- Tense the muscles in the residual limb and then release.
- Wrap the limb in an Ace bandage or take a short walk in the prosthesis.
- Take off the prosthesis if the pains occur while it is on.
- Shift position or stand up
- Take a warm bath
- Gently massage the limb
- Take vitamin supplements such as B12, juniper berry, grape seed extract, Vitamin A, Vitamin E, potassium, calcium, and magnesium.

You Are Not Alone

Approximately 1.6 million people in the United States alone have undergone at least one amputation. That amounts to approximately 1 out of 190 Americans.

Some places you can go for support:

- A therapist
- A support group for amputees and their loved ones, either in person or in an online forum
- Friends and family

Contact Us

Hanger Clinic:

4645 Village Square Drive, Suite J
Paducah, KY 42001

Phone: (270) 554-0100

Fax: (270) 554-5588

http://www.hangerclinic.com/

Amputee Coalition:

Headquarters: 9303 Center Street, Suite 100, Manassas, VA 20110

Main Office: 900 East Hill Avenue, Suite 390, Knoxville, TN 37915

Toll-Free: (888)267-5669

https://www.amputee-coalition.org/